



Weight Training for the Young Athlete

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The participation by young athletes in some sort of weight training program has increased over the past decade due to the expansion of organized youth sports. Therefore, it is imperative that the athletic trainer and coach become very aware of the benefits and risks of weight training for the young athlete. Weight training is traditionally defined as the use of progressive resistance to increase one's ability to exert or resist force. In order to strengthen a muscle, you must use the principle of overload to progressively and gradually challenge the system. This can be done by increasing resistance, repetition or sets, rate of work, or duration of work. Resistance can be provided by a variety of modes, including free weight or machine weights. Each has its own advantages and disadvantages.

Why is weight training so important? The main benefits of weight training are performance enhancement, reduction of injury, and improvement in self-esteem (Cahill and Griffith, 1978, Weltman, 1989). Whether true muscular development occurs in the young athlete with weight training may be questionable, due to insufficient levels of circulating androgens (American Academy of Pediatrics, 1983). Howev-

er, recent research demonstrates that strength gains between 30% and 75% have been observed after short-term strength training programs, depending on program design, quality of instruction, and level of physical activity



(Faigenbaum, Zaichlowsky, Westcott, et al., 1993, Westcott, 1992). In terms of relative strength gain, young athletes can make similar strength gains compared to adults (Pfeiffer and Francis, 1986, Sale 1989). The actual improvement in muscular strength, especially in the female, is probably due to neural adaptations such as increased motor unit activation, changes in motor unit coordination, recruitment, and firing (Ozman, Mikesky and Surburg, 1991, Ramsay et al., 1990).

Weight training safety is a concern for the young athlete. There is no

absolute minimum age at which a child can begin a weight training program, however, the focus for the young athlete should be on form and technique rather than maximal weight lifted. Potential weight training injuries include muscle strains, ligament sprains, and fractures. Injury to the growth plate is probably the biggest concern (Micheli, 1988). The peak incidence of growth plate fractures in boys seems to occur between the ages of 12 and 14 (Blimkie, 1992) and in girls between the ages of 10 and 13 (Kraemer and Fleck, 1993). These injuries can be avoided with proper training progression and adequate supervision. In the case of injury, the trainer and coach should look for signs and symptoms that require medical follow-up. These red flags include pain around a joint, swelling, muscular pain that lasts longer than 72 hours, and pain at night.

Two commonly performed weight training exercises that can cause potential injury are the squat and bench press. The squat exercise is considered by many as the basic fundamental exercise and, when performed correctly, can be very beneficial. To execute the basic squat, the

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By Tamara Stelling, ATC



As swimming season kicks into gear, many shoulders will start feeling fatigued from the increased amount of distance swum and intensity of practice. Many people believe that swimming is an injury-free sport. The undue stresses incurred by the shoulder in swimming, improper technique, poor flexibility, and insufficient strength and endurance can make the athlete more prone to injury.

Unfortunately, if a swimmer is fatigued and his/her shoulders lack flexibility and strength, injury is more likely.

ANATOMY

The shoulder complex is an unstable joint complex that allows the shoulder to move in multiple directions. The bony structures, composed of the humerus, clavicle and scapula, create this joint, which resembles a golf ball sitting on top of a tee. The shoulder's stability comes from the joint capsule, the rotator cuff muscles, and larger muscles surrounding the shoulder. The most forgotten structure in the shoulder complex is the scapula, the base of the glenohumeral joint. The scapula is a movable joint that is fre-

quently the culprit of shoulder pain. The main stabilizer muscles for the scapula are the rhomboids, serratus anterior, and the trapezius.

SWIMMER'S SHOULDER

Pain in the shoulder can debilitate swimmers to the point that they want to stop. Many times the pain occurs early in the season or after winter break due to a lapse in conditioning. Many young swimmers have several disadvantages to becoming an injury-free, competitive swimmer in just one or two seasons. Adolescent and even young college swimmers may not be fully mature in their physical structures. With rigorous training, structural immaturity can also increase the risk of pain developed in this shoulder complex. A swimmer's shoulder will rotate 650 or more times for every mile that they swim. With that many rotations, the risk of an overuse injury increases.

Shoulder pain may include a series of symptoms. Generally the first symptom is a dull pain in the front of the shoulder after activity. This pain can then progress to pain during a specific phase of the stroke. The pain can become so debilitating that any movement of the shoulder complex is painful.

SOURCING THE PROBLEM

Many different injuries can develop in the swimmer's shoulder. The most common injury, however, is subacromial impingement syndrome. Freestyle, the stroke mainly used in

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Weight Training

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athlete must 1) stabilize the spine, torso, and hips; 2) have maximum flexibility in the hip and ankle joints; and 3) possess a base strength of the lower extremities and trunk (Yessis and Wright, 1995). The problem with the squat is that most young athletes are not able to achieve these basic requirements with the addition of maximal weight. For the beginner, form should be practiced over and over before weight is added. Caution should be given to the young athlete with a history of low back pain or diagnosis of spondylolysis/lithesis. Full lumbar extension during the squat should be avoided.

The bench press is another common exercise performed in the weight room. The young athlete needs to be careful in performing the bench press due to the stress on the anterior shoulder and distal clavical. If the athlete has a history of "hypermobile" shoulders or impingement, the following

modifications should be incorporated: 1) hand spacing of no more than 1.5 times the shoulder width; 2) maintaining shoulder abduction less than 45 degrees; 3) maintaining shoulder extension less than 15 degrees; and 4) alternating hand grip (Fees, Decker, Snyder-Mackler, and Axe, 1998).

To lessen the overall chance of injury during weight training, a sports screening should be performed prior to participation to identify "at risk" athletes. In addition, young athletes should be questioned about their previous weight lifting experiences. The weight lifting program should be specifically designed for the athlete and sport, taking into account velocity of movement, contraction type, and contraction force. Regarding the female athlete, more time may be needed to develop base strength and proper form, since most females have limited lifting experience. The instructor-to-child ratio should not be less than 1 to 10 (Faigenbaum and Bradley, 1998).

Gambetta describes three periods for training development. The Foundation Period begins in a range from nine to 11 years and is three to four years in duration. The emphasis of this period is "training to train." General training, speed, and motor skill development performed in a playful environment are the major components of this period. The next period is the Development Period, and it begins in a range from 13 to 14 years for males and 12 to 13 years for females, with a four to six year duration. The goal of this period is to "develop appropriate training and competition behavior." Weight training techniques with sub-maximal loading begins during this period. Maximal lifting is **not appropriate**. Three weight training sessions per week, progressing to six in later years, are recommended. The final period, Period of Mature Participation, begins around the age of 17 for both males and females. This period focuses on increasing strength training. Rooks and Micheli have developed a slightly different approach to weight training in the young athlete. Their recommended lifting dosage is included in Table 1.

Example of Weight Training Regimen for Different Age Groups

Ages	9-11	12-14	15-16	17 and up
Exercise per body part	1	1	2	2
Sets	2	3	3-4	4-6
Reps	12-15	10-12	7-11	6-10
Weight	very light	light	moderate	heavy

Table 1

from Rooks, D. S. and Micheli L. J.

The strength training coach and athletic trainer should work together to develop an effective and safe weight training program for the young athlete of any age. ■

References available upon request.

To fight posture slump, increase lung capacity, and help you breath more efficiently, add back extensions to your regular post-work-out cool-down...or do them anyway, even if you don't work out.

Here's how:

Lie on your stomach with your feet under a couch or held by a partner. Place your hands loosely behind your head and slowly lift your head and chest off the floor as far as you can. Once your head leaves the floor, flex your shoulders back and toward each other. Pause, and slowly return to the floor. Start with as few as five repetitions and

increase the number by two or three every week until you are able to do 15 at a time. This exercise will create more muscles tone in the middle and upper back, which will help you maintain a more erect posture. And once you're no longer slumped over, you'll automatically bring more oxygen into your lungs. ■



Extend Yourself!

from Body Bulletin, October 1995

The Unsung Hero – In Recognition of Student Trainers Everywhere

Arnold Thomas
Head Athletic Trainer, Cy-Fair High School

[Editor's Note: – Student Athletic Trainers provide a great deal of the manpower that enables a relatively few Certified Athletic Trainers to work their magic with thousands upon thousands of athletes. I'm sure coaches and athletic trainers everywhere echo these thoughts.]

Every August in the sweltering summer heat, hundreds of young football, volleyball, and cross-country athletes begin preparing for their upcoming seasons. Football begins with four days of conditioning in shorts and helmets, with many schools having two-a-day practices. Volleyball alternates from practice in the gym to conditioning on the track. As for cross-country, they must work out early in the morning and late in the evening to avoid the heat.

There is another dedicated group of young men and women who also start in August getting ready for the upcoming seasons. They

Get more mileage from your stationary bikes

How? Switch from low tension to a higher tension every 45 seconds. If you do this for 15 minutes each time you work out, it will develop your leg muscles just as much as doing squats – with less chance of injury.

Advice from Pat Eisenman, PhD, professor in exercise and sports science at the University of Utah. Reprinted from Body Bulletin, October 1995.

are the student athletic trainers. These students must prepare to work from August until May, going from season to season, covering all boys' and girls' sports.

Athletic trainers and coaches throughout America will tell you that their job would be next to impossible if not for the help of the student athletic trainer. Their services, which include taping, treatments, rehabilitation, along with covering practices and games, are invaluable to the complete success of any athletic department. They do all these jobs with little, if any, recognition.

I've seen how far a little recognition goes here at Cy-Fair. Campus Coordinator Ronny Peacock always takes the time to write a thank-you note to my staff. The rest of the coaches on staff also come into the training room from time to time to tell the student athletic trainers they did a good job after a practice or a game. These students are no different from the athletes you constantly praise for the job they do on the field or the court. So the next time you have the opportunity to thank them individually, or as a staff, please do so. I have written and would like to dedicate the following poem to all the high school and college student athletic trainers throughout America. ■

"The Unsung Hero"

They start practice in August
In the heat of the day,
Covering every sport
Until the end of May.

Covering practices and games,
With water bottles in hand,
The Student Trainer is always ready
To lend a helping hand.

They always arrive early,
To get ready for the show,
Filling ice chests, stocking kits,
Getting things ready to go.

Heating pools, making ice bags,
Getting ready to tape and treat,
They spend countless hours
Taping the players' feet.

They know all the players
By number and name,
Working to keep them healthy
From game to game.

When you look upon the paper,
You won't see their names,
They don't make big plays
To win the big games.

Day in and day out,
The grind is the same,
Very little recognition,
Just the love of the game.

Working behind the scenes
To achieve success,
They are part of the team—
No more, no less.

The score may be huge,
Or it could be zero,
But, when all is said and done,
The Student Trainer is the true,
unsung hero.



Wealand Elected to Foundation Board

Cramer Products

Tom Wealand, Cramer's vice president of marketing and product development was elected to the Research and Education Foundation board of directors in April of this year. Wealand will be serving as chair of the Sponsor Development Committee, filling the position vacated by Ernie Nelson.

According to Wealand, "This a big honor for me for several reasons. First, as its agenda develops and is implemented, the Research and Education Foundation will play an increasingly more important role in shaping the future of athletic training. Second, I believe Chuck Cramer was the last Cramer employee to serve as a member of any governing body of the NATA, and those are some pretty big shoes to fill."

As chair of the Sponsor Development Committee, Wealand will be responsible for helping to develop proposals which will result in increased contributions to the Foundation from its corporate supplier community. "Operating from within a marketing department of one of the NATA's corporate partners gives me the perspective to understand how to develop proposals which offer tangible benefits to both the sponsor and the Foundation. Wealand said, "that should make investment in the Foundation and its programs more attractive to its current and potential sponsors."

■

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Swimming

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the warm-up, cool-down, and endurance phase, can increase the risk of injury. The motion and the repetitiveness perpetuate the impinging of soft tissue in the shoulder complex. The freestyle stroke motion includes a pull-through phase and a recovery phase. In the pull-through phase, the body is propelled by the arm moving from flexion to extension. The recovery phase is when the arm is outside of the water. During the early to mid pull-through phase, the shoulder is in an adduction and internal rotation position. It then moves into abduction and external rotation position in the late phase. This repetitive motion increases the vulnerability of impingement in the shoulder.

Another reason for the shoulder to develop impingement syndrome is the lack of strength and flexibility in the shoulder, chest and back. If an athlete's posture is kyphotic, the chest muscles are tight, and the back muscles are already stretched. This can also be an indicator for muscle imbalance. Without balance between anterior and posterior muscles, the joint becomes less stable. Good flexibility in the shoulder allows for full range of motion without creating micro-strains in tight muscles. Just the opposite of

good flexibility is joint laxity. Laxity can make the shoulder complex less stable than it already is, resulting in possible impingement. Lax ligaments and muscles can become impinged as these structures shorten during a certain phase of the stroke.

Rotator cuff fatigue can also increase susceptibility of impingement syndrome. The rotator cuff muscle's strength helps prevent the anterior, superior, and posterior translation of the humeral head during motion. If fatigue occurs in the rotator cuff, the stability of the humeral head in the glenoid fossa decreases. Impingement can occur with this increased translation of the joint.

MANAGING THE PROBLEM

Treatment

Once pain begins, ice should follow every workout. Make sure the athlete has ice available immediately after practice to apply at the point of his or her pain. Suggestion may also be made for using an anti-inflammatory medication that could help speed up the healing process and assist in decreasing pain associated with inflammation. Evaluate the swimmer's current activity. Changes should be made in the shoulder's usage during practice to keep the athlete out of the painful range and to

allow healing and decrease inflammation. Avoid total rest of the shoulder joint. Stretching and strengthening exercise should be incorporated into the daily workout. Also, make sure the athlete does not become de-conditioned from the rest. This will only magnify the problem once the athlete returns to full activity. These exercises can either be done on land, in the water, or a combination of the two.

Stretching

Stretching is necessary to get muscles and joints loosened and ready to work out. It is necessary to first warm up the body before stretching can be done effectively. This can be achieved by jogging, swimming laps at an easy pace, or simple plyometrics. After the body is warm, gently stretch out the shoulders, neck, back, abdomen, legs, and ankles. Some important stretches that should be included for the shoulder are listed in Table 2.

CONCLUSION

Swimmer's shoulder can be very debilitating, causing pain with even the slightest movement. Early detection of pain is essential. Monitor the athlete's workout and complaints. Make sure that the swimmer is using proper mechanics in their strokes. The key to injury-free swimming, as in any sport, is to be in good physical condition, flexible, and have adequate strength. Posture is also becoming a larger problem in adolescent and college age athletes. With the increase of backpack usage for everyday activities, more athletes are developing early signs of kyphosis. No sport can ever be injury-free. Be mindful of those sports that tend to be overlooked for injury prevention in competitive athletics. ■

References available upon request.

Important Stretches for the Shoulder

Anterior Shoulder/Chest Wall – Place arms shoulder level with thumbs up. Have a partner or use the wall to horizontally abduct the shoulder. Do this again with thumbs down.

Posterior Shoulder – Place arms at shoulder level. Horizontally adduct arm. Use the opposite hand to pull the arm close to the chest wall.

Inferior Shoulder/Abdominal Sides – Place arms over head. Find a wall or door to grab with a hand. Slowly allow the body to hang, keeping the feet on the floor. If no sturdy object is available to hold onto, use the opposite hand to pull arm, and do a side bend.

Superior Shoulder/Lateral Neck – Sit in a chair. With the arm at the side, grasp side of chair with right hand. Slowly attempt to touch the left ear to the left shoulder. If no chair is available, use the left hand to pull downward on the right arm. Repeat for the other side.

Table 2



Oh, for the good old days when we could hibernate in a warm cave through the winter, living off our body fat! Now we can only do that on weekends. . . if we are lucky. So, to keep healthy and on the move during the dark days of winter, try these strategies.

1. Don't shower more than once a day.

The reason your skin turns armadillo-like during the winter is that the humidity level in the air is so low – just 15-20%. If you're showering once before work and again after an exercise workout, you're drying your skin even more.

2. Stay hydrated One of the biggest dampers on winter exercise performance

is dehydration. Because you don't feel overly hot, you're not aware that you're losing water. But you are – as much as two quarts a day in dry climates. Get in the habit of drinking one full bottle an hour before hiking or snowshoeing, and then sip every 15 minutes when you're out there.

3. Head into the wind as you begin outdoor exercise. That way you'll have a tail wind at your back on the way home, supplying you with a subtle push when you're tired and keeping you from slowing down and getting chilled.

4. Stage your reentry. To gradually bring your heart rate back to normal, taper out

of your activity with a five minute walk at the same temperature in which you've been exercising. Then head indoors for some stretching. This two-stage adjustment is important because abrupt heating dilates blood vessels in the extremities, stealing blood from the heart, which can prompt a coronary in susceptible people.

5. Ask for a miracle flu-fighter. Feeling the achy-feverish onset of the flu? Call your doctor – ASAP. You may receive a prescription for flumadine or amantadine, drugs that – taken within 48 hours of the onset of symptoms – can cut short the course of the virus, and are much more effective than OTC flu medications.

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Outsmart the Season

Continued from page 7

6. Bet on yourself. One university study showed that people who bet \$40 they could maintain an exercise program for 6 months had a 97% success rate - compared with fewer than 20% who didn't take the bet.

7. Illuminate yourself with reflective gear when exercising outdoors in the dark.

8. Ride cross-country on a stationary bike. Hang a map of the U.S. on your wall. After every workout, plot your mileage across it. Challenge a buddy to race across America, and you'll easily stay motivated. ■

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